

SPECIFICATION AMENDMENTS

Amend the descriptive portion of the specification by replacing paragraph [0008] as filed with the following new version of paragraph [0008].

[0008] Figures 1 through 3 illustrate the present invention power end seal 10, and are referred to in this description. The present invention power end seal 10 is designed for, among other purposes, use in [[gear boxes]] gearboxes (not shown) for reciprocating pumps to retain the lubricants used within the [[gear boxes]] gearboxes. Conventional seals used in [[gear boxes]] gearboxes can exhibit special sealing concerns due to high duty cycles, extension rods on pump power ends, and other rod and shaft misalignment in low system pressure applications. The present invention power end seal 10 is a composite seal that optimizes the properties of elastomers, and of plastic or elastomer composite materials. The present invention power end seal 10 is generally formed in the shape [[comprised]] of [[a]] an asymmetrical u-shaped [[U-shaped]], circular seal body 12 having a plurality of arced, [[or]] tangentially-positioned ribs 14 disposed between an inner diameter wall 16 and the outer diameter wall 18. Further, the present invention power end seal 10 includes an inner diameter dynamic seal 20 consisting of a plastic or elastomer filled composite material and the outer diameter rubber static seal 22. The plurality of ribs 14 is preferably made of the same elastomer material from which the seal body 12 is comprised. The u-shaped circular seal body 12 is asymmetrical in that the outer diameter wall 18 is longer in length as compared to the inner diameter wall 16, as observed in an extended length section 18b. However, each wall 16, 18 includes an equal length section, 16a, 18a, both of which are equal in linear length. The extended length section 18b extends in length, past the equal length section 18a. It is within the equal length sections,

16a, 18a, that the ribs 14 are engaged. The extended length section 18b provides the improvement of providing additional surface area 18b of the outer diameter static seal 22 to contact and become affixed, or constrained axially, within the packing bore or gland (not shown) to allow for additional flexibility in the movement of the inner diameter dynamic seal 20. One of the primary benefits of the present invention power end seal 10 is its flexibility to compensate for run-out, or eccentricity. In other words, the power end seal 10 can withstand a large amount of deflection and still maintain static interference in the packing bore (not shown). Another benefit of the present invention power end seal 10 is that it can withstand the above-described deflection while minimizing radial squeeze to reduce heat build up and reduce seal wear. As noted, the inner diameter dynamic seal 20 comprises a filled composite material, wherein one of the ingredients of the composition is either a plastic or an elastomer. Other ingredients of the composition of the seal 20 may, for example, be PTFE, or bronze and PTFE, or carbon and PTFE, or aramid fiber filled HNBR (rubber). Thus, the terms "filled composite," and "filled composite material," each indicates a combination of two or more components, or ingredients, mixed together and made into one homogeneous material. The known natures of the ingredients used herein suggests that they may be so combined, or filled, to form a homogeneous whole by heating a mixture of the ingredients. The resulting seal 20 may, for example, be a filled composite of a plastic and PTFE, or a filled composite of an elastomer and aramid fiber filled HNBR. The term "plastic filled composite" indicates such a composite material wherein one of the ingredients is a plastic. The term "elastomer filled composite" indicates such a composite material wherein one of the ingredients is an elastomer. The inner dynamic seal 20 being comprised of a plastic or elastomer filled composite material, i.e., for example PTFE, bronze filled PTFE, carbon filled

PTFE or aramid fiber filled HNBR (rubber), significantly reduces the wear of the dynamic seal **20** ~~[[of]]~~ affixed to the seal body 12 while maintaining an effective and flexible dynamic seal **20** and static seal **22**. The plurality of tangentially positioned ribs **14** provide flexible tension between the inner wall **16** and outer wall **18** of the power end seal **10** to maintain static interference in the packing gland (not shown), which is especially useful where there is no system pressure in the power ends of the ~~[[gear boxes]]~~ gearboxes (not shown). ~~[[A]]~~ An open, asymmetrical u-shaped channel portion 28 is defined by the space between the inner diameter wall **16** and the outer diameter wall **18**. A seat portion 23 is defined by the external surface of the seal body 12 affixed to and disposed between a lower end of the inner diameter wall portion 16 and a lower end of the outer wall portion 18. The seat portion 23 is perpendicularly affixed to the wall portions 16, 18 of the seal body 12, such that the axial alignment 16x of the inner wall 16 is generally parallel with respect to the axial alignment 18x of the outer wall 18. During the implementation and use of the present invention power end seal 10, the inner diameter wall 16 and the outer diameter wall 18 remain generally parallel with one another, wherein such alignment obviates the need for a back-up ring or other mating components necessary to combat deflection of seals having tapered or inclined cross sections. The plurality of ribs **14** are tangentially positioned between the inner diameter wall **16** and the outer diameter wall **18** and are attached to a top surface **30** of the channel portion **28**. As best seen in Figure 3, each rib 14 is arched, and the location of its attachment to the inner diameter wall 16 is circumferentially offset relative to the location of the rib's attachment to the outer diameter wall 18 to enhance the flexibility between the two walls 16, 18 as described. The present invention power end seal **10** can be used in operating temperatures ranging from -20 to 300 degrees F. Various parts of the power end

seal 10 are produced from the processes of compression, injection or [[transfer molded]] transfer-molded elastomer. Adhesion of the inner diameter wall 16 and outer diameter wall 18 is achieved by adhesive bonding in the molding process for dissimilar materials. Similar materials such as elastomer to fiber filled elastomer is generally achieved by the process of co-vulcanization. Thus, the inner diameter dynamic seal 20 is affixed to the inner diameter wall 16 and the seat portion 23 by such co-vulcanization, whether the seal 20 is a plastic filled composite material or an elastomer filled composite material. The use of higher modulus materials for the inner diameter dynamic seal [[surface]] 20, generally provides that the inner dynamic seal surface 20 does not pull away from the connecting rod (not shown) during operation of the pump (not shown). Rather, diametrical tension causes the inner diameter dynamic seal 20 to travel with the connecting rod (not shown) thus reducing leakage within the [[gear box]] gearbox (not shown). [[The use of plastic of elastomer filled composite material on]] Providing the inner diameter dynamic seal 20 as a plastic filled composite material or an elastomer filled composite material joined to the seal body 12 reduces the footprint or exposure of the higher friction elastomer used to form the seal body 12. Additionally, the present invention power end seal 10 discloses a plurality of [[various]] lip profiles 24, 26 at the upper ends of the inner wall 16 and outer wall 18. Different lip profiles can be formed to the inner wall 16 and outer wall 18 depending upon the specific application for the power end seal 10. The inner wall 16 and the outer wall 18 are not flat, but rather include lip profiles 24, 26 which protrude inwardly and outwardly, away from the walls 16, 18, respectively. The first lip profile 24 extends radially inwardly from the inner diameter surface of an upper end of the inner wall 16. The second lip profile 26 extends radially outwardly from the outer diameter surface of an upper end of the outer wall 18. The lip profiles 24, 26 are

attached to the present invention power end seal 10 such that the circular, asymmetrical u-shaped seal body 12 includes the first lip profile 24 affixed to the upper end of the of the inner diameter dynamic seal 20 and the second lip profile 26 affixed to the upper end of the extended section 18b of the outer rubber static seal 22. The first lip profile 24 protrudes or bulges from the inner diameter dynamic seal surface 20 to make additional sealing contact with the connecting rod (not shown), as the connecting rod engages the inner diameter dynamic seal 20. The second lip profile 26 protrudes or bulges from the outer diameter rubber static seal surface 22 to make additional sealing contact with the packing bore or gland (not shown). It will be appreciated that these and other embodiments may be provided as a power end seal for use in sealing gearboxes of heavy duty reciprocating pumps. Additional embodiments become readily apparent in view of the present invention as described herein above. Having described the invention above, various modifications of the techniques, procedures and materials will be apparent to those skilled in the art. It is intended that all such variations within the scope and spirit of the appended claims be embraced thereby.